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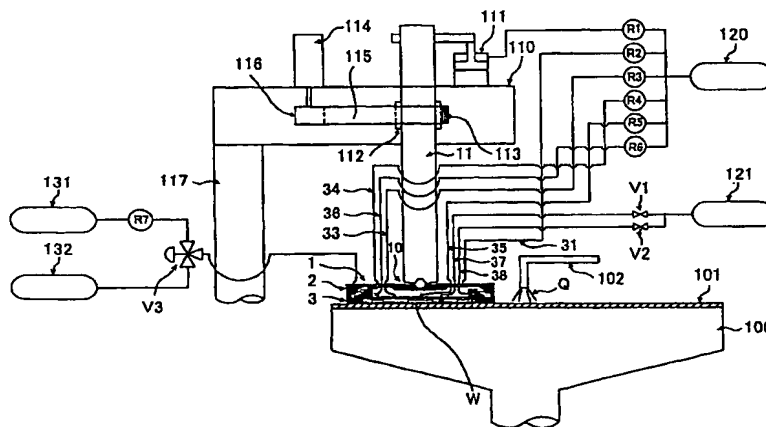
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[Continued on next page]

(54) Title: SUBSTRATE HOLDING MECHANISM, SUBSTRATE POLISHING APPARATUS AND SUBSTRATE POLISHING METHOD



(57) Abstract: A substrate holding mechanism, a substrate polishing apparatus and a substrate polishing method have functions capable of minimizing the amount of heat generated during polishing of a substrate to be polished and of effectively cooling the substrate holding part of the substrate holding mechanism and also capable of effectively preventing the polishing solution and polishing dust from adhering to the outer peripheral portion of the substrate holding part and drying out thereon. The substrate holding mechanism (top ring 1) has a mounting flange 2, a support member 6, and a retainer ring 3. A substrate W to be polished is held on the lower side of the support member 6 surrounded by the retainer ring 3, and the substrate W is pressed against a polishing surface. The mounting flange 2 is provided with a flow passage 26 contiguous with at least the retainer ring 3. A temperature-controlled gas is supplied through the flow passage 26 to cool the mounting flange 2, the support member 6 and the retainer ring 3. The retainer ring 3 is provided with a plurality of through-holes 3a communicating with the flow passage 26 to spray the gas flowing through the flow passage 26 onto the polishing surface of a polishing table.



European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 03/17032

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B24B37/04 B24B55/02 B24B49/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B24B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 776 730 A (RODEL NITTA COMPANY) 4 June 1997 (1997-06-04) page 5, lines 31-34 -----	1,7
X	EP 0 988 931 A (SPEEDFAM CO LTD) 29 March 2000 (2000-03-29) claim 12 -----	1,7
X	US 6 468 136 B1 (CHAN CHIU ET AL) 22 October 2002 (2002-10-22) claim 4 ----- -/-	1,7



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the International filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- * & * document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 03/17032

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 03, 30 March 2000 (2000-03-30) -& JP 11 347936 A (EBARA CORP), 21 December 1999 (1999-12-21) cited in the application abstract -----	
X	US 2002/187728 A1 (HAYASHI TOSHIYUKI ET AL) 12 December 2002 (2002-12-12) paragraphs '0108!, '0120!; figure 1 -----	2-8, 13-19
A	EP 1 197 292 A (EBARA CORP) 17 April 2002 (2002-04-17) paragraph '0049!; figures 1,2 -----	2-8, 13-19
X	US 3 611 654 A (VELLA CARL J ET AL) 12 October 1971 (1971-10-12) column 1, lines 16-19 -----	8
A	EP 1 075 897 A (WOLTERS PETER) 14 February 2001 (2001-02-14) paragraph '0018!; figures 1,2 -----	9-12,22, 23
X	US 2002/193050 A1 (SHARAN SUJIT) 19 December 2002 (2002-12-19) claim 12 -----	20,21, 24-27
X	US 5 762 544 A (BLUMENKRANZ STEPHEN J ET AL) 9 June 1998 (1998-06-09) column 18, lines 40-64 -----	20,21, 24-27

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP 03/17032

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 7 (when dependent on claim 1)

Substrate holding mechanism and substrate polishing apparatus having a retainer ring made of a polyimide compound.

2. claims: 2-6, 7 (when dependent on 2 to 4), 8 to 27

Substrate holding mechanism and substrate polishing apparatus / method comprising means / steps that relate to the cooling or temperature control of the polishing table and/or substrate holding mechanism components.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 03/17032

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0776730	A	04-06-1997	JP 3072962 B2	07-08-2000
			JP 9155730 A	17-06-1997
			EP 0776730 A1	04-06-1997
			KR 267597 B1	01-11-2000
			SG 77575 A1	16-01-2001
			US 5645474 A	08-07-1997
EP 0988931	A	29-03-2000	JP 2000084836 A	28-03-2000
			EP 0988931 A2	29-03-2000
			KR 2000022666 A	25-04-2000
			TW 400264 B	01-08-2000
			US 6273803 B1	14-08-2001
US 6468136	B1	22-10-2002	NONE	
JP 11347936	A	21-12-1999	NONE	
US 2002187728	A1	12-12-2002	EP 1197293 A1	17-04-2002
			WO 0156742 A1	09-08-2001
			JP 2001291690 A	19-10-2001
EP 1197292	A	17-04-2002	JP 2002187060 A	02-07-2002
			EP 1197292 A2	17-04-2002
			SG 97201 A1	18-07-2003
			US 2002042246 A1	11-04-2002
			TW 546185 B	11-08-2003
US 3611654	A	12-10-1971	NONE	
EP 1075897	A	14-02-2001	DE 19937784 A1	22-02-2001
			EP 1075897 A1	14-02-2001
US 2002193050	A1	19-12-2002	US 2002081950 A1	27-06-2002
US 5762544	A	09-06-1998	JP 9168968 A	30-06-1997
			JP 2003289057 A	10-10-2003